Lakewater at Willamette Valley reservoir.

Chapter 15 New Challenges and Old Problems

Environmental Concerns

In the 1970s, the Portland District engaged in both traditional and innovative tasks, strongly influenced by the social and political ferment of the previous decade. The usual dredging, jetty maintenance, multiple-purpose dam construction and operation, and water resource planning took place in a new social context that required altered thinking and work methods. In particular, the environmental movement of the 1960s had a great impact upon the Corps of Engineers and the Portland District. Environmentalism repudiated one of the oldest American practices: unrestrained exploitation of natural resources for maximum economic development. It drew upon hopes voiced by earlier conservationists that something constructive could be done to halt the wasteful depletion of the national estate. The new environmentalists combined the older conservation movement which concentrated upon husbanding water, trees, soil, game, and fish with an emphasis upon wilderness preservation and a recognition of ecological principles. Though rooted in the 19th century, preservation and ecology became the most prominent, if not the most significant, features of the conservation cause.

Environmentalism sprang from several elements. Many preservationists admired wilderness simply because it seemed the opposite of the evils of the polluted, crowded, unsafe cities. The short-lived "counter-culture," with its rapturous enchantment of the natural world's seeming freedom and goodness represented another source. Others felt a kinship with the world of nature gained through mystical experience. Ecologists argued that the untrammeled use of chemical pesticides would undermine the world's health through the destruction of food chains. Other scientists and laymen, concerned about radiation fallout, attacked the testing of atomic weapons in the atmosphere. Many assaulted the old belief in economic growth for its own sake as destructive of natural resources. Biologists predicted ecological disaster because of the human "population explosion." Citizens attacked the arrogance of scientists and technologists whom they believed had gone to unwise lengths in their attempts to control nature. From whatever source, the environmental movement testified to a new concern—sometimes superficial, sometimes profound—about the future of the natural world.[1]

Congress responded to this popular movement with legislation reflecting the environmental cause. The wilderness movement obtained three triumphs in the 1960s: the National Wilderness Preservation System (1964), the prohibition of dams on the Colorado River between Hoover Dam and Glen Canyon Dam (1968), and the National Wild and Scenic Rivers System (1968). At the close of the decade, Congress passed the far reaching National Environmental Policy Act of 1969. In the preamble, Congress declared it the policy of the federal government to use "all practicable means, . . . to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans." The heart of this landmark statute required federal agencies embarking upon projects that would affect the natural environment to file impact statements assessing the social, economic, environmental, and engineering effects of their proposals. This piece of legislation had immediate ramifications for the Corps.[2]

Conservationists questioned specific Corps projects for their impact on the environment and challenged the traditional selection method for specific water resource and navigation projects. Historically, political, technical, and bureaucratic considerations dictated the way the Corps carried out its responsibilities for implementing flood control and navigation on the nation's rivers and harbors. The traditional, 18 primary steps in the decisionmaking process for public works projects largely excluded informed public debate of proposed projects and heavily favored interests promoting the traditional methods for carrying out the Corps' mission, such as channelization, dredging, and dams.[3]

The relationship between a project's local proponents, congressmen, and the Corps created a closed process that largely excluded opponents from being heard until the major decisions had been reached and congressional authorization attained. By the 1960s, environmentalists and other critics successfully challenged the procedure in a number of instances. In light of the new ecological awareness sweeping the country, the Corps

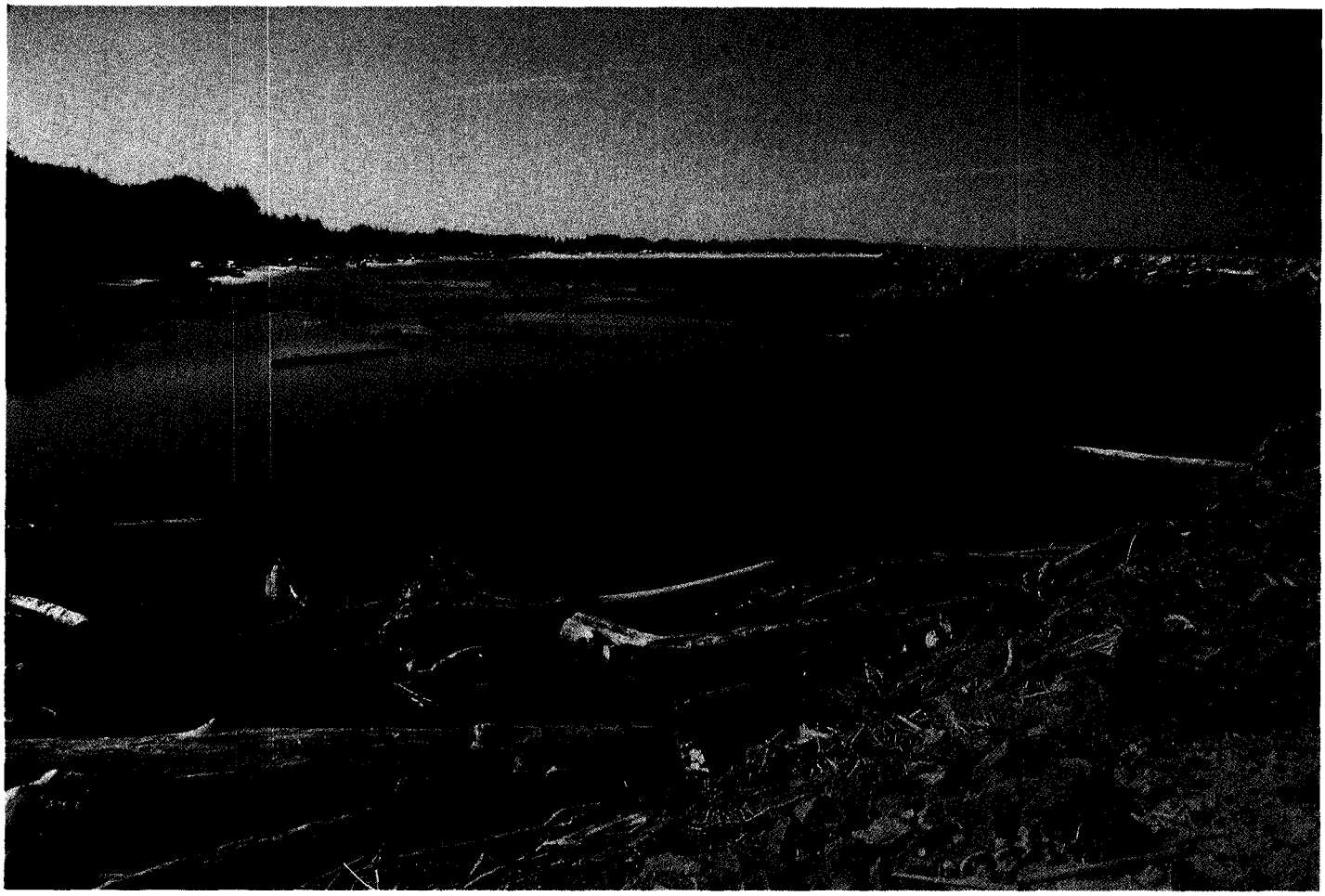
above: 18-step authorization process and follow-through construction phase of Corps projects.

reexamined its method of citizen involvement in agency decisionmaking and its traditional engineering approach to problems.

The Chief of Engineers, Lieutenant General Frederick J. Clarke, set the tone of this response in his statement of the Corps' environmental policy on 2 June 1970. He pledged that members of the Corps "will encourage and support efforts to bring the best existing ecological knowledge and insights to bear on the planning, development and management of the nation's water and related resources," and that "environmental values will be given full consideration along with economic, social and technical factors." In addition, he announced: "We will encourage as broad public and private participation as practical in defining environmental objectives and in eliciting viewpoints of what the public wants and expects as well as what it is projected to need.[4]" The River and Harbor Act of 1970 also required the Corps to establish guidelines insuring the consideration of possible adverse social, economic, and environmental effects of its programs.[5]

In the same year, as a first step in incorporating an environmental ethic within the Corps, the chief created an Environmental Advisory Board of nationally known environmentalists to advise on all environmental problems and issues concerning present and future policies and programs. In addition, the chief specifically directed all division engineers to take seriously the Corps' environmental initiative. Finally, in November 1970, Clarke issued a set of environmental guidelines to assist operating personnel in applying these values in project formulation and evaluation. Henceforth, environmental considerations became an integral part of all project planning. The real test of the Corps' commitment would come in the quality of the individual district responses to specific environmental issues.[6]

The Portland District made early changes to accommodate this new environmental awareness. In 1970, the district engineer, Colonel Paul Triem, established a district Advisory Council on Environment to review Corps activities pertaining to environmental issues and to make recommendations to improve environmental quality on its projects. Among its first assignments, the council gathered information about marine estuaries along the Oregon Coast. The district engineer established an Environmental Quality Section staffed by specialists in the fields of environment and ecology to advise him and to cooperate with environmental agencies outside the district. In the following year, to better reflect its increasing responsibilities, the section became the Environmental Branch. Beyond these organizational changes, Colonel Triem explained in frequent interviews and speeches the district's commitment to the environment. He stressed the Corps' genuine dedication to



above: Oregon coast estuary.

giving greater importance to environmental considerations in evaluating new public works projects. Colonel Triem admitted that the era of large-scale multiple-purpose development had closed. Henceforth, the Portland District would concentrate on non-structural solutions to water resources development and flood control efforts: "we will concentrate on the use and management of resources, through project and other means, for human ends and on services rendered rather than projects built."[7]

Actions of the Portland District matched these intentions in many different directions. Section 13 of the River and Harbor Act of 1899 required those depositing refuse in navigable streams to obtain permits from the Corps of Engineers. The courts long interpreted this section to mean that refuse dumping could be prohibited only if it menaced shipping, but a U.S. Court of Appeals decision in 1970 broadened the scope of the statute to mean that the Corps could deny permits for refuse disposal on environmental grounds. The district used this new interpretation vigorously. For example, in March 1970, upon referral by the Corps the U.S. Attorney successfully sued the agents of the vessel *Hong Kong Mail* for dumping garbage into Swan Island lagoon. In August 1970, to comply with the National Environmental Policy Act and the Water Quality Improvement Act of 1970, the district applied tighter standards when requiring permits for discharges into Oregon's more than 100 navigable rivers. In March 1971, the district assigned three full-time inspectors to the Navigation Division to deal with the required permits.[8]

Environmental activities by the Portland District took many forms. For instance, the Corps provided protection to Oregon's two largest colonies of purple martins at Fern Ridge Lake near Eugene and on the Columbia River. To cover the scars left by machinery, the district planted trees at the rock quarry used for the construction of Cougar Lake Dam. The district also ordered construction areas at the Blue River Lake project seeded and fertilized by air to replace vegetation. The contractor on the Lost Creek Lake project used an ingenious rock conveyor belt, rather than three miles of terrain-destroying road construction. District employees also participated in the Corps of Engineers National Shoreline Study begun in 1970 and completed in the following year. The study inventoried Oregon's 500 miles of shoreline comprising 352 miles along the Pacific Ocean and 148 miles along the estuaries of the state. It noted that critical erosion occurred at Clatsop Beach near the mouth of the Columbia and at Bayocean Peninsula near Tillamook.[9]

As the district expanded its environmental protection activities, it began to receive recognition for them. In late 1974, the Environmental Defense Fund praised the Portland

Planting trees to reclaim machinery scared land

District's wetlands review study of Siletz and Alsea Bays for rigorously evaluating construction permit requests in these two estuaries. In August 1974, the Corps and the Environmental Protection Agency issued new regulations expanding the existing permit program over the next two years to include wetlands adjacent to navigable water; primary tributaries of navigable waters, natural lakes greater than five acres in extent, and their adjacent wetlands; and secondary or other tributaries of navigable waters downstream of the point where the flow exceeded five cubic feet per second. That same year, the Corps issued a new set of regulations requiring future water resources projects to give equal consideration to economic development and environmental quality. In February 1977, the Portland District received the highest of the Chief of Engineers' first annual environmental merit awards for its wetland review of the Siletz, Alsea, and Nehalem estuaries. The Chief's Environmental Advisory Board, composed of members of environmental and public interest organizations, selected the district over nominees submitted by the Corps' 11 stateside divisions and five research laboratories.[10]

While the district engaged in new environmental initiatives, previously authorized but unfinished projects received renewed scrutiny from environmentalists. For example, critics charged that the Rogue River Basin projects, Applegate and Elk Creek dams, had serious environmental shortcomings. The district eventually satisfied the concerns arising over Applegate but failed to do so in the case of Elk Creek. The various environmental impact statements filed on these projects chart the debate between the Corps and its opponents.[11]

Environmental considerations had a major impact on other pending dam projects in southwestern Oregon. After a lengthy study of the Umpqua River Basin, the Portland District recommended in 1971 the construction of the Days Creek multiple-purpose dam.[12] The 254-foot high rockfill embankment dam would provide flood control, irrigation, hydroelectric power, fishery enhancement, water supply, recreation, and water quality improvement. With strong local support for the $113 million project, Congress authorized it in 1974. In the next three years, as the district prepared the design memoranda and environmental impact statements, critics raised questions about downstream turbidity, projected fisheries benefits, and the benefit-to-cost ratio. By 1976, estimated costs had risen to $200 million. In 1977, the district withdrew the Phase I Report on Days Creek from the Board of Engineers because of marginal economic justification for the project. The Corps subsequently placed the dam in the deferred category.[13]

Cascadia Dam on the South Santiam River also underwent reevaluation based on environmental concerns. Congress had authorized this rockfill embankment dam for flood control storage in 1962. The Corps dropped the site originally selected because of objections by the State of Oregon and local citizens that it would inundate Cascadia State Park and a historical mineral spring. After a site above Foster Lake was chosen, new objections to the dam arose. In 1970, opposition by environmentalists such as the Oregon Environmental Council, Citizens for a Clean Environment, the Sierra Club, and the Wilderness Society caused Congress to eliminate funds for the project. These organizations contended that the dam would spoil the scenic character of the South Santiam River and would be needed only every 10 or 20 years for flood control. Environmentalists moved to have the State Highway Department designate the South Santiam as a scenic river under the state's Scenic

Umpqua River site of proposed Days Creek Dam

Flooding on the South Santiam River which Cascadia Dam was proposed to control

Waterway Act. In the spring of 1972, Senator Robert Packwood asked for an investigation by the General Accounting Office of the benefit-to-cost ratio for the dam. On the basis of this investigation, he later declared his opposition to the Cascadia project on both economic and environmental grounds. The Corps ultimately placed the dam in the deferred category.[14]

The colloquies between the Portland District and environmentalists resulted in a gradual improvement in the quality of the district's environmental impact statements. Corps' guidelines required a final EIS to contain all written responses to a draft environmental statement for a project. Publication of such assessments, with Corps' responses, provided a valuable public record of the central issues in a project's formulation and justification. Over the decade, the informed and legitimate queries raised in response to early environmental statements forced the district to provide more precise details and supporting documentation for its conclusions. The statements had to present a fuller discussion of potentially adverse impacts from the proposed project and to give more attention to alternative approaches.[15]

Over time, critics found the EIS a key device for influencing the Corps' decisionmaking process, especially when the project was well along in the steps leading to construction. Environmental groups such as the Sierra Club hoped to persuade the Corps to incorporate an objective assessment of environmental impacts in the early planning and public participation in project formulation, rather than take corrective measures after authorizations. In 1978, the district reorganized the Planning Branch of the Engineering Division to better integrate the assessment of environmental impacts into the early stages of the planning process and to better coordinate the overall planning function. To accomplish

these goals, the district merged the functions and personnel of the Environmental Quality Branch with those of the Recreation Planning Section to form a Natural Resources Section. During the 1970s, the Portland District made a strong commitment to integrating environmental concerns into its planning, construction, and operations functions. Given its location in a section of the nation renowned for its natural beauty and environmentally-conscious citizens, the district will continue being held to high environmental standards.[16]

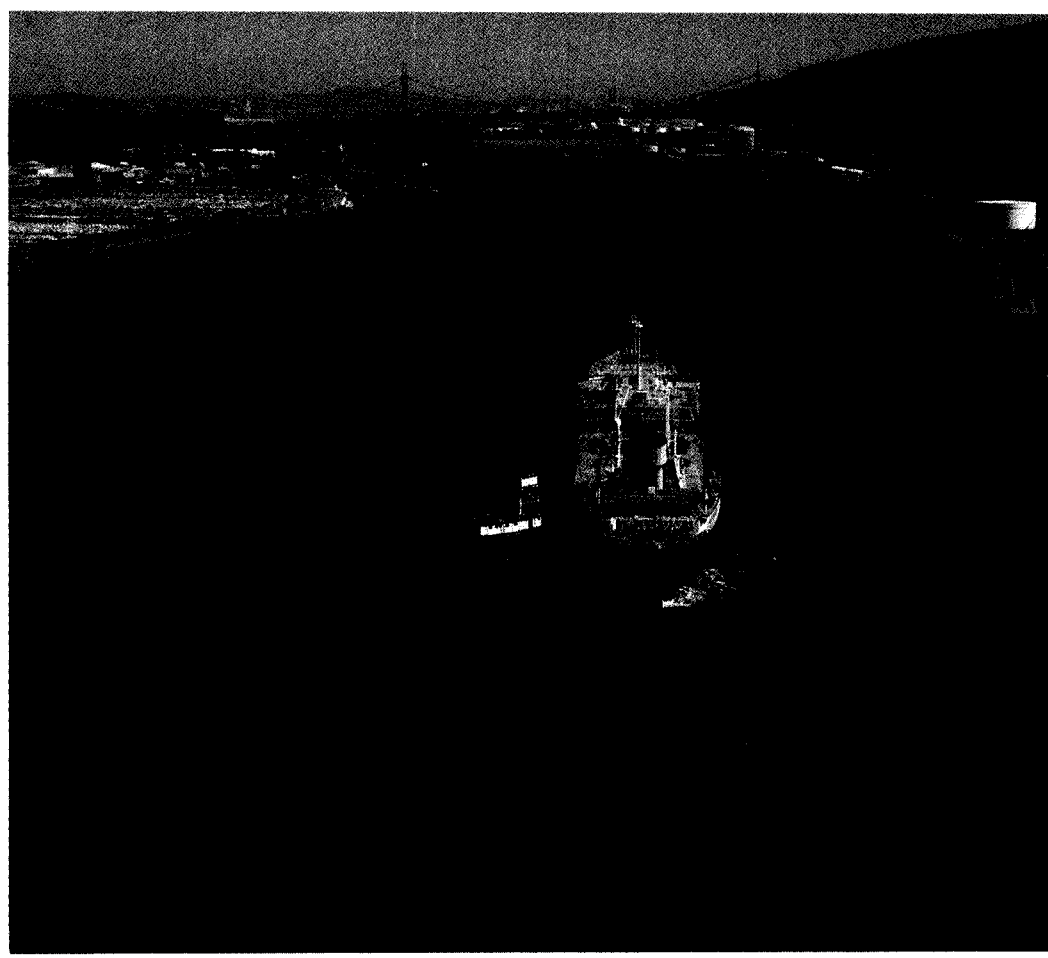
Traditional Concerns

Although the growing environmental challenges of the 1970s forced Portland District personnel to grapple with new problems, the district also labored on the existing navigational improvements on the coastal rivers and harbors and on the Columbia. These improvements were maintained chiefly by annual dredging, which had been a constant part of the Corps' activity in the Pacific Northwest since 1867. The Columbia ship channel, from the 20-foot waterway in 1878 to the 40-foot project in 1962, required removal of great quantities of material from the navigation channel after each spring freshet. During the 1970s, a third of the district employees worked in dredging operations. The district had responsibility for dredging the waterways of the entire Pacific Coast, as well as its own. To accomplish its mission, the Portland District possessed moorings second in size only to those of the Memphis District, which conducted dredging operations on the Mississippi River.

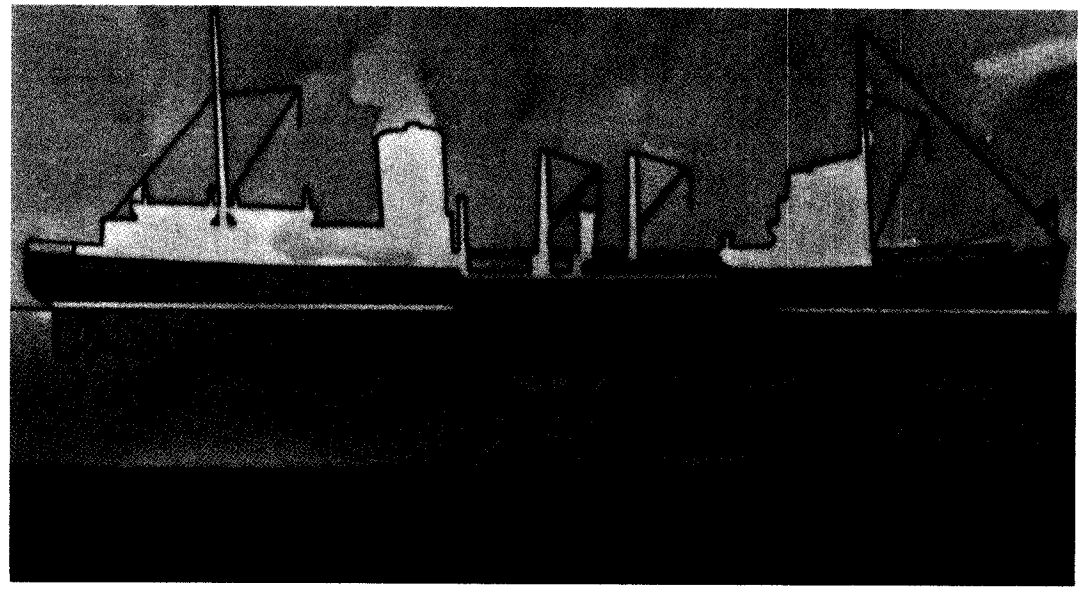
Through 1980, Portland District's three seagoing hopper dredges worked on both ports and ship channels. The hopper dredges included the *Biddle,* the largest at 351 feet long, with a crew of 93; the *Harding* at 308 feet, with a crew of 65; and the *Pacific* at 180 feet, with a crew of 44. These seagoing ships dredged from Washington to Southern California on the west coast and in the Hawaiian Islands and Alaska.[17]

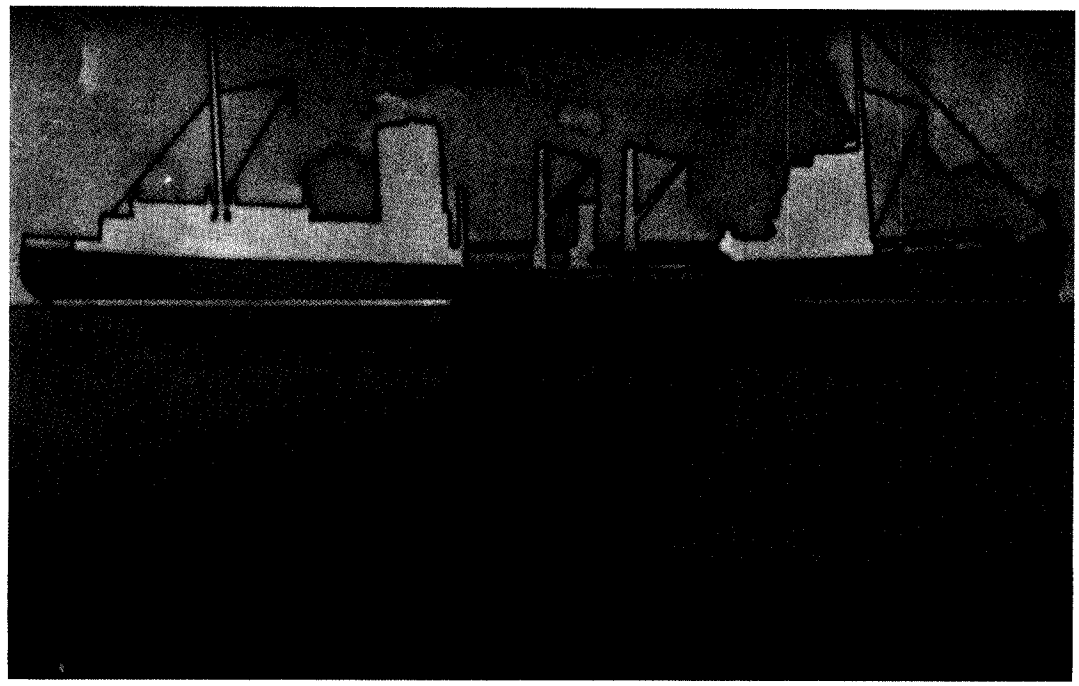
The hopper dredges operated by sucking material into their hoppers from both the port and starboard sides. Capacity ranged from 3,060 cubic yards in the *Biddle* to 500 cubic yards in the *Pacific.* When the hoppers filled, the dredge sailed to deep water, usually at sea, and dumped the material. A hopper dredge had certain advantages over pipeline dredges: it could work in water exposed to open seas and could be quickly transferred under its own power. The Corps found such dredges adaptable to locations without bank disposal areas. Moreover, because it required no extensive disposal pipeline, the hopper dredge did not interfere with navigation.[18]

The dredging work of the district underwent some changes in the 1970s. The hopper dredge *Davison* returned in 1972 after six years of service in Vietnam. The *Sandwick,* a new



Heavy commercial river traffic in the Portland area emphasizes the need for a deeper Columbia River channel.





top: Hopper dredge collecting debris from river bottom; bottom: When full, the hopper dredge moves to deeper water and releases river bottom debris.

type of dredge, joined it in the district fleet. This imaginatively designed vessel represented another response to the Corps' environmental protection mission by offering an alternative solution to the old problem of where to deposit material dredged from the river or ocean bottom. Equipped with a sand agitator, the dredge forced the bottom sand aside to clear the channel without removing the sand from its bed. The new vessel was named for Raymond G. Sandwick, who had logged almost thirty years as a Corps employee, the last six as Chief of the Navigation Branch of the North Pacific Division, before he retired in 1970.[19]

District dredging capacity also gained with the temporary assignment in April 1977 of the hopper dredge *Essayons* to assist in dredging the channel at the mouth of the Columbia. The 525-foot-long ship, the largest of the 17 hopper dredges operated by the Corps, carried 8,270 cubic yards of spoil in her hopper. With the assistance of the *Biddle,* the *Essayons* accomplished full maintenance of the 48-foot-deep entrance channel to the Columbia for the first time since work on the project started in 1956. While new ships such as the *Sandwick* and *Essayons* appeared, old ones completed their term of service. In November 1973, the *Luckiamute* left active service, and in June 1977 the district decided to sell its other two venerable pipeline dredges, *Wahkiakum* and *Multnomah,* both launched in 1913. The *Multnomah* had left service in 1967 and the *Wahkiakum,* in 1972 after a disabling fire. In another drege disaster, the freighter *Hawaiian* rammed the *Biddle* in August 1977 during a heavy fog at the mouth of the Columbia. It appeared for a time that the *Biddle,* with her engine room and two compartments flooded and all power lost, might sink, but pumps stabilized her until temporary repairs allowed towing her to drydock in Portland. The ship returned to service in December 1977.[20]

The Corps' second oldest function, flood control and flood fighting, continued as an important responsibility of the Portland District during the 1970s. With the completion of most of the feasible flood control reservoirs, the district gave increased attention to non-structural approaches in the prevention of flood damages. The key to this effort involved offering new flood plain management services, first authorized by Congress in the 1960 Flood Control Act. The comprehensive effort of the district prevented the loss of millions of dollars and unnumbered lives. However, since no flood control structure could provide total flood protection, the district had to carry out emergency flood-fighting activities on several occasions.

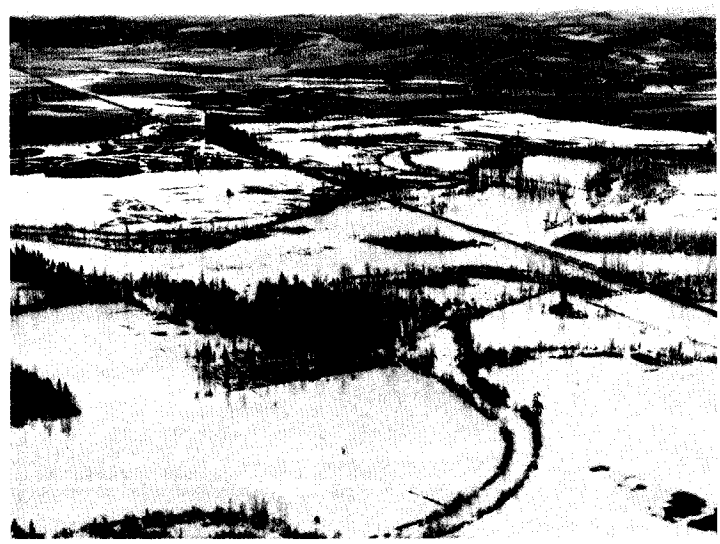
Heavy winter rains in 1971 and 1972 demonstrated the limits of the district's flood prevention capability. In the first weeks of 1971, an ominous set of weather conditions built up over western Oregon. An unusually heavy snowfall deposited nine inches at Astoria and at North Bend on the Oregon coast. Then a wave of unseasonably warm moist air followed by heavy rainfall caused a rapid runoff throughout the Willamette Valley and the coastal drainage basins. Rivers without flood control structures, such as the Rogue and the Umpqua, rose to high flood levels. Yet where the Corps had constructed flood control reservoirs, on the main Willamette River and its principal tributaries, rivers remained generally below their major flood stages.[21]

In the following January, two large storms swept over the northwestern part of Oregon. Several areas in coastal Tillamook county reported severe flooding and required emergency assistance from the Corps. The 24 district employees who fought the 1972 floods were well prepared, for many of the flood-fighting crews had engaged in simulated flood exercises the previous November. During the second storm, seven of them coordinated the entire operation, around the clock, from the District Emergency Operations Center, while 17 served in the disaster areas evacuating flood victims, protecting dikes, and providing material and equipment to minimize the flood damages. After the flood waters receded, district personnel inspected damaged areas, advised on repairs, and prepared damage reports. Total damages from the Tillamook flooding reached $4.8 million.[22]

While the 1972 floods in western Oregon caused total damages of almost $17 million along the coastal streams and in the Willamette basin, the amount of destruction would have been much higher but for the reservoirs of the Willamette Valley. Without these storage facilities, the floods of the valley would have been seven to thirteen feet higher and caused $27 million in losses. After the river stages receded, district crews assisted local officials in removing debris jams and assessing damages.[23]

In the spring of 1972, a major flood prevention effort captured a good deal of public interest. The heavy snowfall of the previous winter threatened a huge volume of run-off for the Columbia River and brought back memories of the massive flood of 1948. Colonel Triem began preparations for this potential emergency in March. He appointed 11 teams of engineers to meet with local officials of river communities to inspect flood control structures and potential trouble spots along the stream banks. This effort represented a regional part of the federal program called "Operation Foresight."[24]

In May, Operation Foresight in the Portland District took a new turn. Colonel Triem announced that the Corps would put a temporary sand plug at the lower end of the Columbia Slough in Portland to prevent flooding of North Portland neighborhoods. The



1964 flooding in the Willamette Valley

Community effort to make flood levee sandbags.

closing of the slough reduced its water level and the threat to the protective levees along its banks. Another Operation Foresight measure, to protect areas of North Portland where the flood waters broke through in 1948, involved spreading a vast blanket of 100,000 cubic yards of sand over the railroad embankment west of Delta Park golf course. Both the blanket and the plug, which the Corps pulled in July, helped prevent Columbia River flooding.[25]

Two years later flooding again endangered the residents of northern Oregon. In the winter of that year, conditions resembled those that preceded the major floods of 1964-65. By early January 1974, a deep snowpack lay on the Cascade Mountains, in some places 200 percent more than normal. Underneath it the ground lay frozen to a depth of four to six inches. On 12 January, warm moist air began to blanket Oregon and a heavy rainfall started the next day causing a rapid run-off of the melting snow resting on the frozen ground. In many areas of western Oregon and Washington, destructive flooding began on 15 January; and between that day and 19 January, the district placed the Emergency Operations Center on a 24-hour operating basis. Governor Tom McCall declared a state of emergency for western Oregon and local civil defense and emergency services went into action in the afflicted region.

Fifty district personnel provided an extensive range of technical services to local and state government officials. Corps' crews, among other emergency work, patrolled levees along both sides of the Columbia and helped local authorities make temporary repairs to flood control levees in the Rogue River Basin. They made suggestions for the restoration of the water supply at Ashland and sent sandbags to Washington and Clackamas counties to hold back the Tualatin River. The district installed additional pumps in the Scappoose Drainage District on the lower Columbia. Local public and private agencies handled most of the emergencies during the flood itself.

The Portland District provided a great deal of postflood recovery assistance to local communities. It removed debris in many locations so streams and rivers might again flow freely, restored the Willamette River levee at Albany, placed a channel plug in the Clackamas River, repaired a fire station at Tualatin, renewed levees on the Applegate River, rebuilt sewers in Roseburg, made road repairs in Glendale, fixed streambanks on the Nestucca River, and broke a log jam at Tillamook. The district spent $2,758,300 on postflood rehabilitation work. Teams from the Portland District surveyed damages, estimating lossess of the January 1974 flood at $65,918,800. The Corps teams also projected that prevented damages reached $311,281,300—a tribute to the 11 completed Willamette Basin flood control reservoirs.[26]

Heavy winter rainfall and snowmelt during November and December 1977 once again brought major flooding in western Oregon. The emergency required 24 district employees to render technical assistance and to act as flood-fight leaders. The district Emergency Operations Center directed the effort, providing aid to the hard hit lower Columbia drainage districts and regulating the Willamette Basin reservoirs for minimum outflows. Postflood recovery work included restoration of damaged roads and flood control structures, debris removal, stream clearance, and repair of public-owned facilities at a cost of $2.1 million. Flood-damage field surveys estimated total losses at $16.2 million.[27]

District Planning Mission

With conventional flood control structures unable to provide total protection, the Corps engaged in comprehensive flood plain management to reduce losses to life and property. The Portland District technical assistance program aided private individuals and all levels of government in the prudent use of flood plains. This service included making available data on the extent of flooding, flood flow velocity and duration, and floodway limits. The program also assisted communities and others in the formulation of flood plain regulations, flood-proofing measures, and in meeting federal flood plain management objectives. Since the district issued its first flood plain management report on the Rogue River Basin in 1965, it has furnished over two dozen others to local and state agencies. During 1980, the district responded to 1,150 requests for flood plain technical services and planning guidance.[28]

The Portland District's longstanding interest in water resources development also found expression in its contribution to the Corps' Urban Studies Program. This program derived from various resolutions of public works committees of Congress mandating regional wastewater management programs for certain urban areas, coupled with other urban water resource programs. Congress authorized the Corps in 1970 to conduct a series of pilot wastewater management studies in several major metropolitan areas of the United States. The Water Quality Act of 1972 expanded this mission to include the same type of planning and engineering assistance to regional bodies and to states upon request. In the Urban Studies Program, the Corps became involved in an inter-governmental effort to solve a wide range of water resources problems, ranging from water quality and flood control to bank and channel stabilization.[29]

Portland District initiated its first study under this program in 1974 when Congress, responding to a request of the Columbia Region Association of Governments, authorized funds for a Portland-Vancouver Metropolitan Area Water Resources Study. The authors of the study plan described their purpose as an investigation of "water and its use in the Portland-Vancouver metropolitan area—where it comes from, how it is used and reused, and where it goes." Since the district designed the study to present alternative plans for regional water needs to the year 2000, it concentrated on finding technically and economically feasible water resource strategies implementable by local government.[30]

The problem areas investigated by the district included water supply, wastewater management and water quality, drainage management, and dredging in Portland harbor. Planners considered recreation and fish and wildlife enhancement as they related to the other study topics. The final review not only provided intrinsically valuable findings on water resource problems but also disclosed that there existed neither a framework to coordinate the work previously done nor a collective sense of what still needed accomplishing in water-related planning. The Corps' Metro study filled this information and planning gap and established an overall picture of how various portions of water resources related to each other and to environmental concerns.[31]

In May 1976, the district presented the preliminary planning report for discussion. It then held a series of public meetings in the following September to obtain comments about the initial planning report. The district used the information obtained at these meetings and through other public involvement mediums to reshape the studies leading to the final

Citizens attend public meeting concerning Corps developments in their community

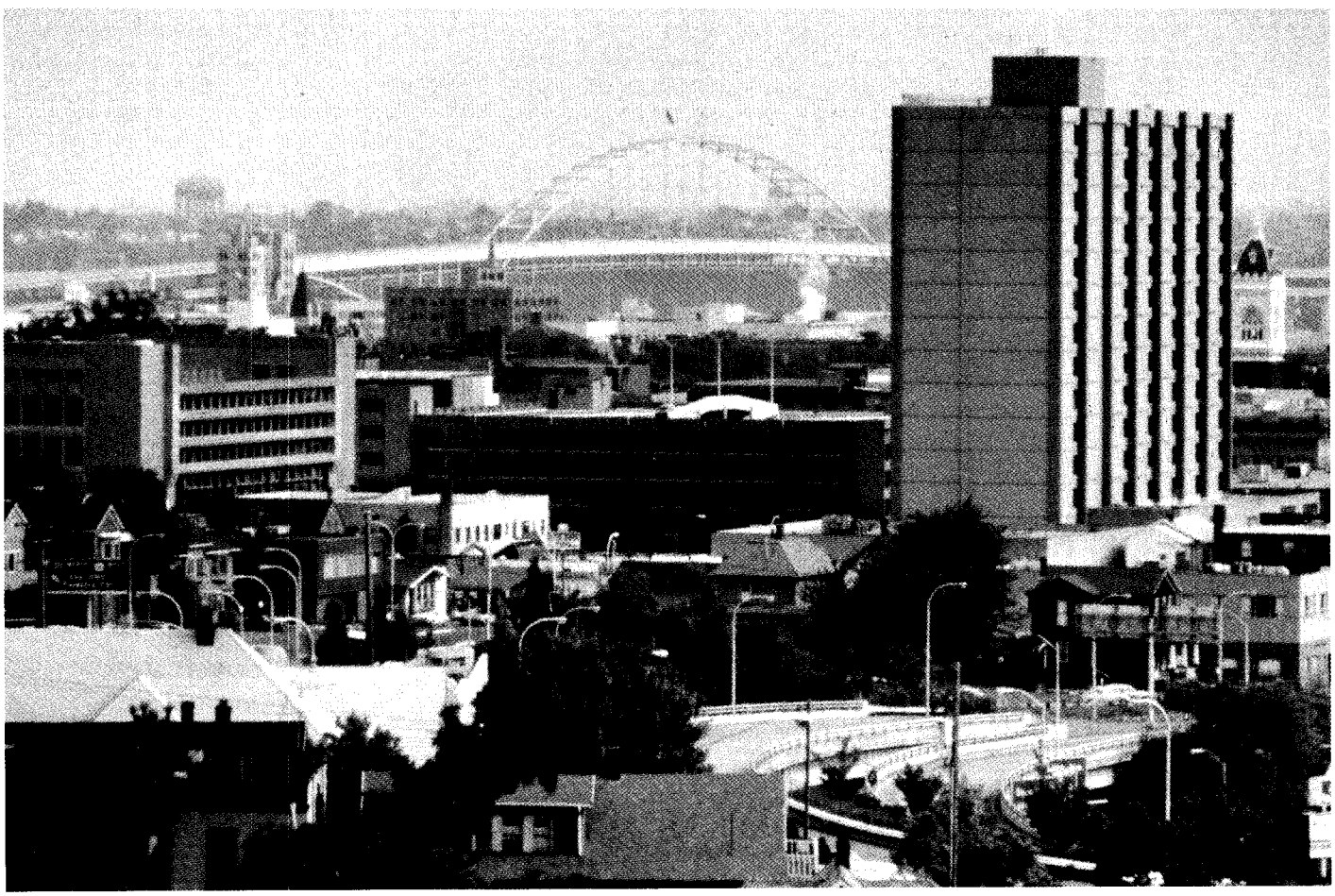
recommendations released in 1979. The study also included an institutional analysis, identifying the organizational and financial capabilities of the local governmental agencies. This analysis provided strategies for implementing the alternatives contained in the main report. In the final submission, the Corps offered to the regional and local governments three to five alternative plans for each problem area studied. The ultimate choice among the options rested with those bodies.[32]

The Corps of Engineers never worked in isolation from other public agencies or private interests. In the 1970s, the Portland District contributed to several inter-agency projects initiated in the preceding decade. These endeavors, all involving extensive cooperation with numerous public or private bodies, included the Columbia-North Pacific Framework Study and the Columbia River and Tributaries Study.

The Columbia-North Pacific Framework Study evolved from earlier ventures in regional planning. In 1961, a Senate select committee proposed a national planning program on water resources, and Congress authorized the comprehensive study in the Water Resources Planning Act of 1965. This measure established twenty regional framework studies to investigate water resources within the contexts of economic development, preservation, and well-being of people. In June 1967, under the authority of the Water Resources Planning Act, the President established the Pacific Northwest River Basins Commission, composed of representatives of five Northwest states and ten federal agencies including the Corps of Engineers. This commission assumed overall responsibility for the Northwest Framework Study which sought to provide a broad guide to the best use of the region's water resources for the present and foreseeable future.[33]

Within the framework's planning objectives of economic efficiency, regional development, and environmental quality, the Portland District's major contribution came in the areas of navigation and flood control. In the first of these matters, the district submitted data relating navigation to the regional economy through an examination of existing navigation improvements, existing and prospective commerce, vessel traffic, and present and future navigation problems. In a final section, the district made recommendations with cost estimates for channel and harbor improvements, locks, port facilities, and aids to navigation for the region, projected to the years 1980, 2000, 2020. On the subject of flood control, the district submitted an assessment of "the flood problems of the region as they affect the overall development of water and related land resources" and prepared data for future planning. To fulfill these broad purposes, the district report described the region's

below: The city of Portland studied by Portland District's Urban Studies program.

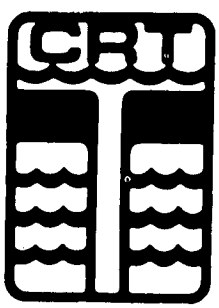


environment and economy, past and present flooding and flood control measures, and proposed solutions to prevent or reduce future flooding.[34]

In addition to its responsbility for the framework reports on navigation and floods, the Corps participated significantly in the studies and analysis that resulted in the main report as well as those appendices concerning the region's water resources, economic base and projections, recreation, fish and wildlife, electric power, and the comprehensive framework plans for each of the twelve subregions in the study. The resulting report and appendices provided a planning tool for preparing future water and related land use projects and programs. The North Pacific Division coordinated the Corps' contribution to the Framework Study.[35]

After the Corps completed its first basin-wide report on the Columbia River in 1932, Congress periodically called for updates to keep pace with economic development and population growth in the Pacific Northwest. The Corps completed major reviews in 1948 and 1961. At the request of Congress, the Corps began another such review during the 1970s. The North Pacific Division coordinated the Columbia River and Tributaries Study (CR&T) with the district in charge of the actual investigations. Four significant physical changes in the Columbia River Basin during the preceding decade necessitated the review. Five major dams had been finished or were close to completion, doubling storage capacity in the Columbia River system. A high-voltage interconnection between the Pacific Northwest and the Southwest had been established permitting power exchanges between the two regions. Major modifications to existing structures such as additional powerhouses at Grand Coulee and Bonneville dams had been authorized. The growing population of the Pacific Northwest had created an increased regional demand for electrical energy. To assess the impact of these changes and evaluate the new public concern for the natural environment of the basin, Congress created the CR&T Study in 1972.[36]

Through this ambitious study, the Corps sought to review existing projects, some of which had been authorized thirty years earlier, to recommend modifications in the project structures and their operating procedures and to suggest new features if needed. The CR&T Study concentrated on immediate problems rather than long-range topics, which came under the Pacific Northwest River Basins Commission's framework analysis. In August 1972, the Corps' districts in the Pacific Northwest held five public meetings to help in developing an inventory of problems that the study would address. Various federal and state agencies and over 40 public workshops throughout the basin, including ten in the Portland District, further reviewed and refined the preliminary inventory. In June 1973, the division engineer, concerned that environmental interests dominated the public workshops, ordered his district engineers to "continually strive for balanced public participation by encouraging representation by a cross-section of responsible groups of individuals" to ensure a hearing for "the developmental points of view." In the fall of 1973, Colonel Gilkey, reported to the division engineer that the workshop participants expressed skepticism of the need for major new projects while supporting full development of existing facilities.[37]



above: Logo for Columbia River and Tributaries Study

By August 1974, completion of this stage of the project resulted in the publication of an *Inventory of Problems and Areas of Concern* that provided a complete listing of known river problems. From this compilation, the Corps selected, as the next stage of the study, certain projects to improve in the light of changing social and environmental concerns. These included an enlarged navigation lock at Bonneville Dam, a second powerhouse at McNary Dam, and levee improvements in the Rivergate area of North Portland.[38]

An inventory of the Columbia River from its mouth to McNary Dam, published in April 1977, constituted one of the first finished products of the CR&T Study. This inventory identified interest areas through field studies, interagency review, and public meetings and workshops that might be affected by increased power generation on the river to meet electrical needs in the mid-1980s. For example, on the reach downstream from Bonneville Dam, the survey identified 105 sites including ports, farming area, general recreational facilities, sports hunting and fishing sites, and commercial fishing that would have to be taken into account if the river's water level were altered for power production or increased irrigation withdrawals. Other CR&T mid-1980s system reports in which the district participated included reach inventories from McNary Reservoir up the Snake to the Clearwater River, another from McNary Reservoir to the Grand Coulee Dam, and the *Base System Description for Mid-1980s.* The district also assessed the role of pumped-storage in meeting the region's future peak power needs.[39]

An important part of the CR&T Study of the lower Columbia concerned the problem of flooding. Initial work began on this matter in 1948 and periodic destruction, especially from high water in December 1964, demonstrated the continuing inadequacy of protection systems along the lower Columbia. Congress requested a new study in 1966, and the Corps combined this investigation with its CR&T review in 1973. The division engineer felt that both studies shared so many factors in common that cost savings and proper management dictated combining them. The Portland District still had responsibility for carrying out all

necessary studies for the joint report. A key part of the district effort involved a levee inventory and flood damage survey on the lower Columbia to provide data for reevaluating the operations of existing reservoirs in the entire flood control system.[40]

The Portland District flood study focused on the Rivergate-North Portland Area, a particularly troublesome section of the flood plain between the Willamette and Sandy Rivers. The Corps' analysis took a broad view, considering possible navigation improvements, environmental concerns, and recreation needs, as well as additional flood protection. The district engineer's 1976 report recommended a perimeter levee, closure of the Columbia Slough, and extensive recreation developments at a cost of $15.9 million. The district dropped the navigation improvement as not economically feasible. The project received considerable public input during its formulation, and the final plan had the energetic backing of the League of Women Voters and local governments. However, the Chief of Engineers returned the report to the district for reformulation, based on a new Corps policy limiting expenditures for recreation. The study recommended recreation and fish and wildlife enhancement plans amounting to 75 percent of the total project cost, while the new guidelines restricted Corps participation in such areas to 10 percent over the costs for flood control. Projects exceeding this limit needed prior approval of the Chief of Engineers. Although the project has strong local support, it remains in an inactive status.[41]

A third comprehensive river basin study, largely the work of the Portland District, concerned the Willamette River Basin. As discussed in chapter twelve, Congress originally called for this investigation in 1961. The district, with the assistance of other state and federal agencies, produced it in 1969. Under the sponsorship of the Pacific Northwest River Basins Commission, this survey focused on five goals—leisure, health and safety, economic growth, conservation of resources, and environmental protection—in preparing a comprehensive plan for the construction of 15 new storage reservoirs, modification of an existing reservoir, and enlargement of one authorized reservoir before 1980. Principal elements in the long range plan, projected for needs in the year 2020, included 37 reservoirs and programs for water pollution control, fish and wildlife, recreation, irrigation, flood control, navigation, and power.[42]

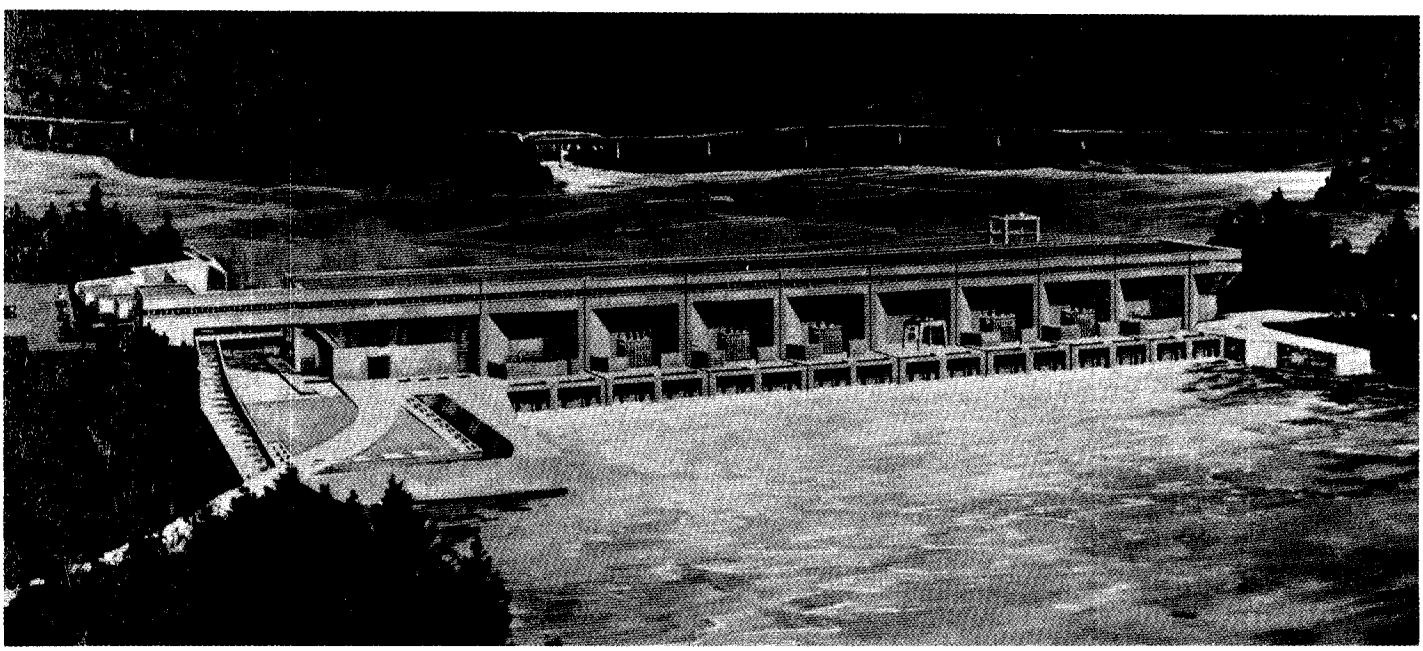
Bonneville Second Powerhouse

Bonneville Dam, the oldest of the District multiple-purpose projects, continued making news throughout the 1970s. The need for additional power and enlarged navigation facilities led to plans for a second powerhouse on the Washington side of the Columbia and a new navigation lock on the Oregon shore. Although hardly its intention, the powerhouse project plunged the District into a lengthy controversy of national proportions.

In January 1965, the Bonneville Power Administration requested that the Corps prepare a proposal for an additional powerhouse at Bonneville. The completion of the three upstream dams in Canada and Libby Dam in Montana had increased the low water stream flows in the Columbia River. The increased stream flows exceeded the existing generating capacity at Bonneville, and unless an additional powerhouse were built, a large amount of potential energy for the expanding Pacific Northwest would be lost. The original Bonneville Act authorized additional power generation facilities when required by electrical demand.[43]

By the early 1970s, Portland District engineers designed a project for eight new generators which would meet burgeoning power demands and reregulate peaking releases.

below: Artist's conception of Bonneville Second Powerhouse.



The district held a public hearing in August 1971 to explain the purpose and location of the second powerhouse and to receive testimony from all interested parties. At this meeting numerous representatives of industries and public and private utilities testified to the need for the project. Sportsmen's groups and agencies divided; some lamented the potential loss of one and one-half miles of excellent fishing grounds, while others welcomed the powerhouse as a check against nitrogen supersaturation deadly to fish.[44]

The powerhouse project did not become controversial because of its potential impact on the environment. The main issue dealt with the fate of the town of North Bonneville, Washington. Citizens of this small community discovered that their town lay directly on the site of the new powerhouse. For seven years, the consequences of that fact absorbed large amounts of district time and resources. The controversy received national media attention, usually in terms of embattled citizens struggling against the rapacious Corps, in the pages of such diverse publications as *Sports Illustrated, Variety,* and the *Christian Science Monitor.* Preliminary discussions between the Portland District and the town officials revealed the community's desire to reestablish itself at a new site. The Mayor of North Bonneville expressed enthusiasm at the prospect of creating a new town: "The city council is all for relocation. We can build a model town for Skamania County. Not many towns have the opportunity we have." This optimism soon disappeared as residents became aware of the limitations of existing federal law concerning their removal.[45]

The Relocation Assistance Act of 1970 authorized the Corps to deal with individuals but not local governments in relocating citizens. Most inhabitants of North Bonneville wanted to remain together in a new site, but the district could not accommodate this desire in any planned manner under the terms of the Relocation Act. Recognizing this impasse, Representative Mike McCormack of Washington secured a provision in the Water Resources Development Act of 1974 that authorized the Corps to participate directly with the government officials of North Bonneville in planning a new town, in acting as a real estate broker for lands in the new town, and in building utilities for its residents. Under subsequent agreements, the Corps promised that homeowners and businesses would receive compensation for their property and the opportunity to relocate in the new town at fair market value. The government also provided rent-free interim housing to those dislocated before lots became available in the new town. Replacement of municipal facilities in the new location would be at no cost to the town. The Corps' relocation effort marked the first

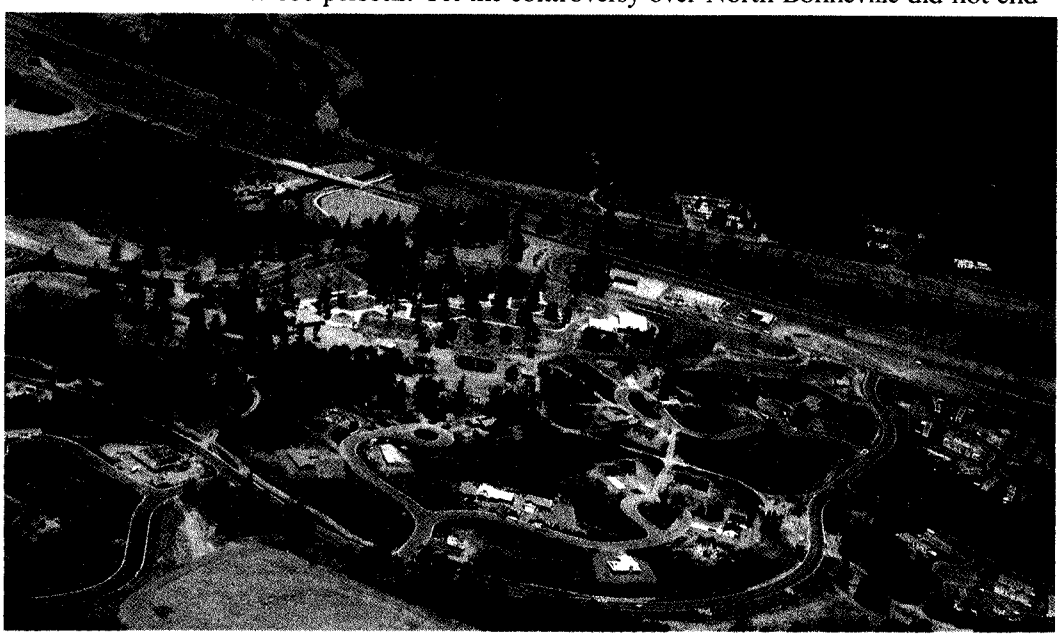
below: The old town of North Bonneville on site of authorized Bonneville Second Powerhouse.

expenditure of federal funds to plan, design, and develop a new community in connection with a water resource project.[46]

In March 1974, at a public meeting the citizens of North Bonneville chose the site for their new town, and in July the town officials signed a contract with the district authorizing preliminary studies for site plans and cost estimates. In November, the two parties agreed that the Corps would fund all design and planning for the new town. A series of public workshops provided continuing citizen comment during the planning and design phases. By April 1975, however, the town officials charged that the Corps had violated its prior agreements. They filed a suit in federal court alleging that the Corps had not helped local residents find economic assistance available through federal agencies, that it had failed to file an adequate environmental impact statement, and that it charged residents a lot improvement fee in violation of the contract provision requiring the Corps to replace 100 percent of municipal facilities and utilities.[47]

Members of the Oregon and Washington Congressional delegations stepped in with a solution. The Corps and the town agreed in May that the Corps would convey lands in the relocated town at prices corresponding to fair market value of unimproved land paid at the time of purchase by the Corps; that the Corps would administer the design project for the relocation, with plans subject to final approval by the town; that the Corps would arrange meetings between residents and federal agencies such as the Small Business Administration; and that the town would conditionally agree to withdraw its suit against the Corps.[48]

In August 1976, the Portland District awarded a construction contract for a model town to accommodate 600 persons. Yet the controversy over North Bonneville did not end



New town of North Bonneville.

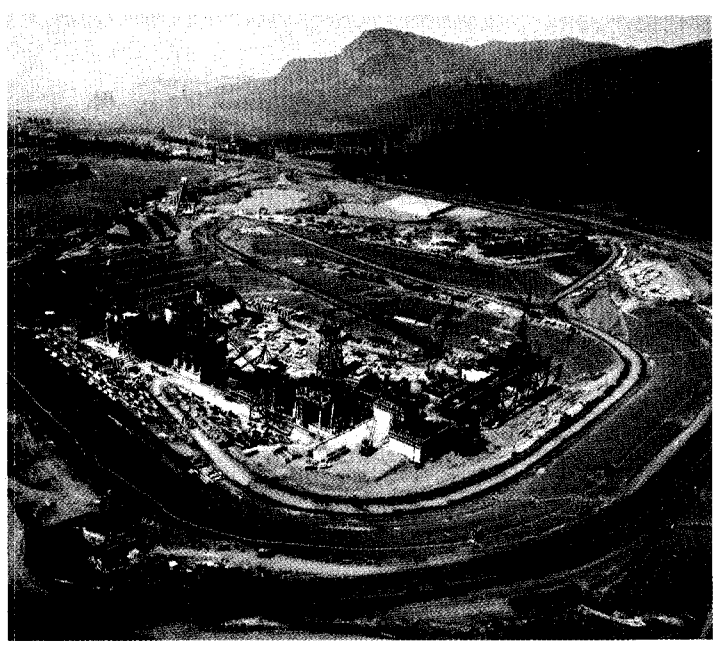
Dedication ceremony for North Bonnville.

with the signing of this contract. The town started new litigation asserting the right to retain the land of the former town and to levy a business and occupation tax of one half of one percent within its boundaries. This tax would fall on the powerhouse contractors and add approximately $1.5 million to the project's cost. The town also enacted an anti-noise ordinance which would make construction impossible. The Corps accordingly sued to invalidate these two ordinances. A resident of the town then sought an injunction against work on the new powerhouse until the Corps completed the new town. An out-of-court settlement resolved some of these issues in December. At that time, the town agreed to modify its enforcement of the anti-noise ordinance and the Corps agreed to offer mobile homes for the use of residents displaced by construction until they could move into their homes in the new town. The Corps also agreed to provide the plat of the new town to the town officials.[49]

Once again, the town claimed that the Corps failed to live up to its agreements and, in February 1977, sought an injunction prohibiting further construction. The town asserted that the Corps had provided neither the plat nor the promised interim housing. In early May the town stated that no more building permits would be issued for construction of the powerhouse until the Corps issued the citizens their lots in the new town. By mid-month the Division Engineer, Major General Wesley E. Peel, consented to deed the new lots. In August, however, the city stopped issuing construction permits when a group of North Bonneville businessmen filed a damage suit against the city, maintaining that the Corps had not granted them their full relocation benefits. In September, the Corps obtained a condemnation order from the federal district court giving it possession of the old town of North Bonneville. Work could now proceed on the powerhouse while the suit awaited decision. By the following month, the district completed the new townsite and municipal facilities. In March 1978, an exchange of deed gave the town possession of the new site and the Corps ownership of the old.[50]

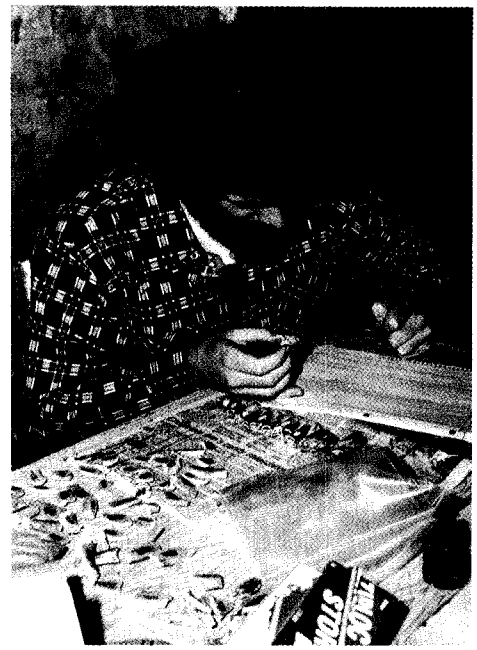
Throughout the controversy the people of North Bonneville held a different view of the government's obligations in relocating the town than did the Corps. The Corps had never before assisted in planning the relocation of a town as a whole. The Corps narrowly interpreted its legal obligations during the relocation effort. On the other hand, the townspeople continually expected more financial compensation for the negative impact of the process of powerhouse construction and town relocation than the assistance legislation allowed. The community believed its long-term cohesion and economic viability were at stake. The Corps, in its environmental impact statement, asserted that it was "not authorized to run a chamber of commerce type operation to insure 'viability'." In spite of disagreement and misunderstanding on both sides, the district successfully completed the $35 million relocation project, and the residents dedicated the new town in July 1978.[51]

While the story of the relocation of North Bonneville captured most media attention, the power project moved forward. In August 1974, the district awarded the first construction contract. The improvement contained a number of engineering challenges. The site required locating the new powerhouse on a prehistoric landslide, with foundation rock more than 100 feet below the surface. Contractors had to excavate 15 million cubic yards of earth and rock to provide a new channel for the Columbia, as well as construct a 1,400-foot tunnel through



Construction of second powerhouse at Bonneville project.

right: Overview of archeological dig at Bonneville construction site, far right: Numerous items were found by workers at site. below left: All items found needed careful cleaning, below center: Each item was numbered for identification, below right: Each items number and description was recorded.

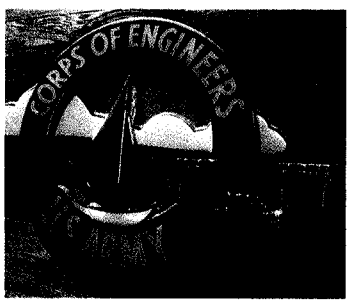


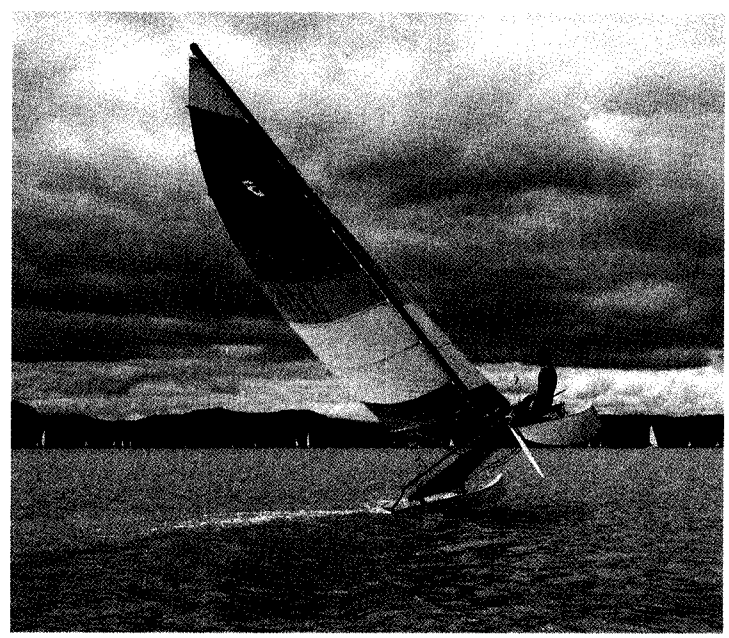
unstable ground for the relocated railroad. Four miles of state highway also required rerouting over the same terrain. The district used such innovative construction techniques as making the framework for the railroad tunnel outside the cavity and digging a two-foot-wide, one-mile-long underground seepage cut-off wall to keep river water out of the excavation site. The 180-foot-deep cut-off wall resulted in considerable savings over the cost of pumping out the water. The powerhouse project, estimated to cost $575 million, is due for completion in 1982. At that time, all eight generating units will produce 560,000 kilowatts, more than double the capacity of the existing Bonneville project.[52]

A survey conducted during the early stages of the powerhouse project discovered a significant archeological site, containing evidence in an undisturbed state of a sequence of occupations from prehistoric through historic times. The site lay in the middle of the new river channel below the powerhouse. The district nominated the site, noted in the journals of Lewis and Clark, to the National Register of Historic Places and awarded a $1.2 million contract to recover the cultural materials necessary for site interpretation.[53]

While the relocation of the town of North Bonneville and the construction of the second powerhouse continued, the district also investigated the need for a new navigation lock at Bonneville to accommodate the greater volume of commerce along the Columbia-Snake system. The existing Bonneville Dam lock is 76 feet wide by 500 feet long; all other locks on the Columbia-Snake system are 86 feet wide by 675 feet long. This discrepancy meant that barge tows made up for all the upstream locks must be broken into smaller units to pass through Bonneville and then reassembled for the upstream passage. In addition to

right: Bonneville Lock and Dam Visitor Center on Bradford Island





above: U.S. Army Corps of Engineers recreation insignia, right: Visitors enjoy sailing on Portland District's Fern Ridge Lake in the Willamette Valley.

inadequate dimensions, the configuration of the lock at both approaches presented hazardous conditions to shipping. The Board of Engineers for Rivers and Harbors approved the district's 1978 recommendation for a navigation lock with the same dimensions as the seven other Corps upstream locks. Design and construction of a new lock, if authorized and funded by Congress, would require eight years to complete. The Corps estimated that the present Bonneville lock would reach capacity by 1990.[54]

The Corps upgraded other facilities at Bonneville during the 1970s. The district opened a new five-level visitors center at Bradford Island in 1975. The building contained a fish-viewing room, interpretive displays of the construction and function of the dam, and exhibits on the natural and human history of the Columbia Gorge. One year later the Corps financed an addition to the Bonneville Hatchery for the Oregon Department of Fish and Wildlife. This project served as mitigation for the loss of fall chinook spawning grounds above John Day Dam by tripling the egg holding and juvenile rearing capacity for fall chinook.[55]

During the 1970s, public recreation at Corps' projects received heavy emphasis. Recreation development by the Corps initially resulted from the Flood Control Act of 1944. This measure allowed the Corps to provide recreation facilities at reservoirs as an "incidental" project purpose. If a lake were likely to be visited, the Corps had authority to provide roads, sanitary facilities, picnic facilities, picnic areas, parking lots, boat launch ramps, first aid provisions, campgrounds, and safety aids. The 1944 act also authorized local or state agencies to build recreation facilities on federally owned land at Corps of Engineers'

Visitors to The Dalles Lock and Dam enjoy the day-use picnic area.

projects under lease agreements. The 1962 Flood Control Act and the Federal Water Projects Recreation Act of 1965 contained the most important legislation affecting Corps of Engineers' recreation activities. Both of these acts amended or supplemented the concepts of the 1944 act. The 1962 act established recreation as a potential primary project purpose. The Lost Creek Lake project became the first Portland District project including recreation as an authorized primary purpose. The 1965 Federal Water Project Recreation Act established a formula by which the federal government assumed 50 percent of the recreation costs of a project sponsored and maintained by a local agency on federal water project lands. This included all costs for land purchased specifically for recreation and construction.[56]

Within the Portland District, the leading recreational attraction is Bonneville Dam. In 1980, slightly over two million persons visited this project to view the fish ladders, engage in various water sports in Bonneville reservoir, or just enjoy the beautiful scenery. Fern Ridge Reservoir in the Willamette River Basin is the second most heavily used recreation area in the district. In 1980, it experienced about 1.8 million visitors. Together, these two projects accounted for 53 percent of the total attendance at Portland District recreation facilities in 1980. Besides the diversified recreation facilities provided by the Corps at 16 projects in the Portland District, the U.S. Forest Service, the state of Oregon, and various counties operate parks and recreation areas in conjunction with Corps' projects.[57]

Many recreation opportunities on the Oregon coast have been enhanced by improvements of the Portland District. In addition to projects designed specifically to offer recreation, efforts to open the coast to commercial navigation also created recreational opportunities. The jetty work which improved the entrances to 11 rivers or bays on the Oregon coast aided pleasure boating by providing calm waters over the bars and outer reaches of entrance channels. Finally, the district built numerous small boat basins and harbors on the coast and lower Columbia, providing owners of fishing vessels or other pleasure craft with safe water and mooring facilities.

Growing from an incidental amenity to a major responsibility, the Corps' recreation program provides outdoor opportunities for millions of Americans. To sustain long-term public use of its recreation areas, the Corps developed a resource and wildlife management program. For example, the Portland District employes fish and wildlife biologists, foresters, landscape architects, outdoor recreation planners, and other resource professionals to manage its recreation-resource activities. While energy shortages temporarily reduced recreation usage at district facilities in the late 1970s, long-term demographic trends coupled with the Northwest outdoor lifestyle indicate increased future demands on those facilities. The recreation facilities of the Portland District water resource projects also represent valuable assets to the tourist industry of the region.